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TEMPERATURE AND HUMIDITY REGULATION IN SMALL INCUBATORS

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One of the chief requisites of equipment for temperature and moisture control in incubators utilized in testing small lots of material is that it should occupy a minimum of space, allowing a maximum of capacity for the test materials. While it is obligatory that the activating units be within the incubator, frequently one or more of such space-occupying accessories as water tanks, motors, relays, etc., are also included. To remedy this condition, several incubators at the European corn borer research laboratory, Toledo, Ohio, were equipped recently with the operating mechanism entirely external. The equipment herein described is designed only to regulate the air temperature and humidity within the incubators at points above those of the surrounding air. The installation of a cooling coil and a waste pipe to carry off the condensed moisture would provide temperature and humidity conditions within the incubator below those of the room in which the unit is installed.

The temperature is controlled by means of a commercial thermostat consisting of a fixed mercury tube in which a movable electrode is activated by a magnet supported in proximity to the tube on the arm of a bimetallic coil. Heat is supplied from a standard socket, in which is placed a resistance-wire heating unit for temperatures of considerable differential from the surrounding air (fig. 1). A light bulb of low wattage is used when temperatures approximating or slightly higher than those of the surrounding air are desired.

The relative humidity is controlled with a humidostat, by means of which the secondary circuit of a relay is closed or opened through the spring action of the metal arm of the contact point and the effect of the moisture in the air on strands of hair. Moisture is supplied by means of a long, slender spray tube from a suction-type medical atomizer (fig. 2). This tube enters the incubator near the top (fig. 1,A) and is directed close to one of the walls, thereby giving the emanating mist a maximum evaporating space and causing the loss of a minimum amount of storage space.

Relays for both the temperature and the humidity control units are fastened to the outside of the incubator, but they could be placed on top or beneath or in any available space near the incubator. The relays are of the electromagnetically operated tilting mercury-tube type, and the contactor tube is, in each case, so wired that all current is cut off when air conditions within the incubator reach the desired point.

Air for the atomizing nozzle is supplied from a low-cost electric air compressor, such as is used for paint-spray outfits, which may be set up in any convenient location near the incubator. The water is contained in a small zinc tank fastened to the side of the incubator (fig. 3).

Since the moisture is supplied in the form of a fine mist, there is very little build-up of humidity after the desired air condition is reached.

The uniformity of both the temperature and the relative humidity within the incubator may be improved by the use of a small, low-speed distributor fan.

The approximate cost of the equipment utilized in the installation described above is as follows:

Atomizer nozzle	\$1.40
Motor and compressor with tubing	11.07
Thermostat	4.50
Relays, 2 at \$6.00 each	12.00
Parts for hair humidostat	1.00
Electric light socket	.10
Heating unit	.25
Wire	.10
Total	\$30.42

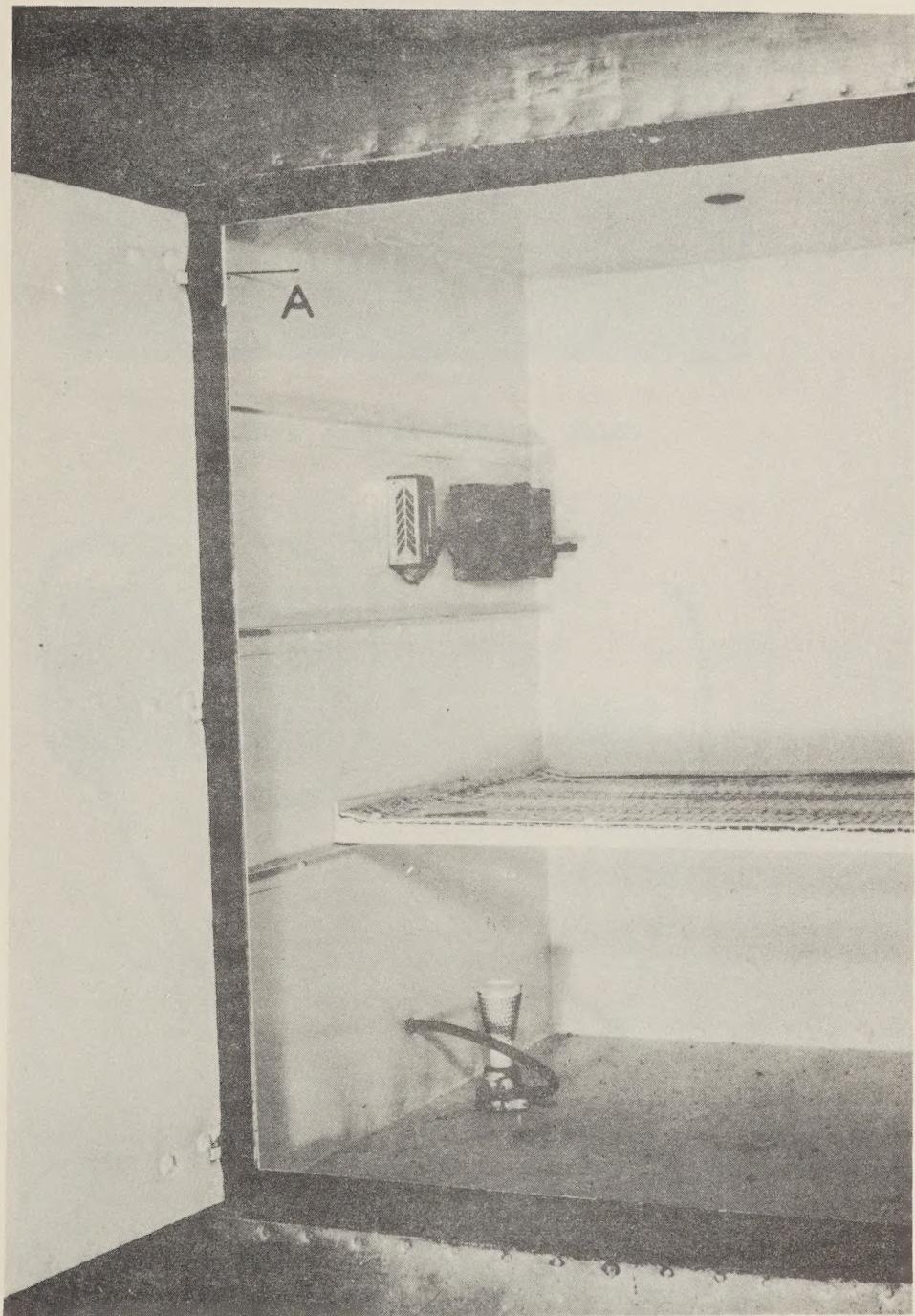


Figure 1.--Interior of incubator, showing small amount of space occupied by control equipment.

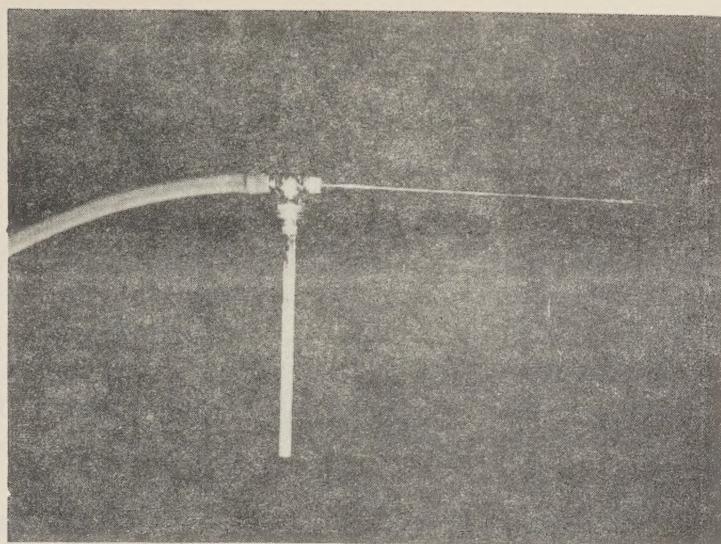


Figure 2.--Atomizing unit.

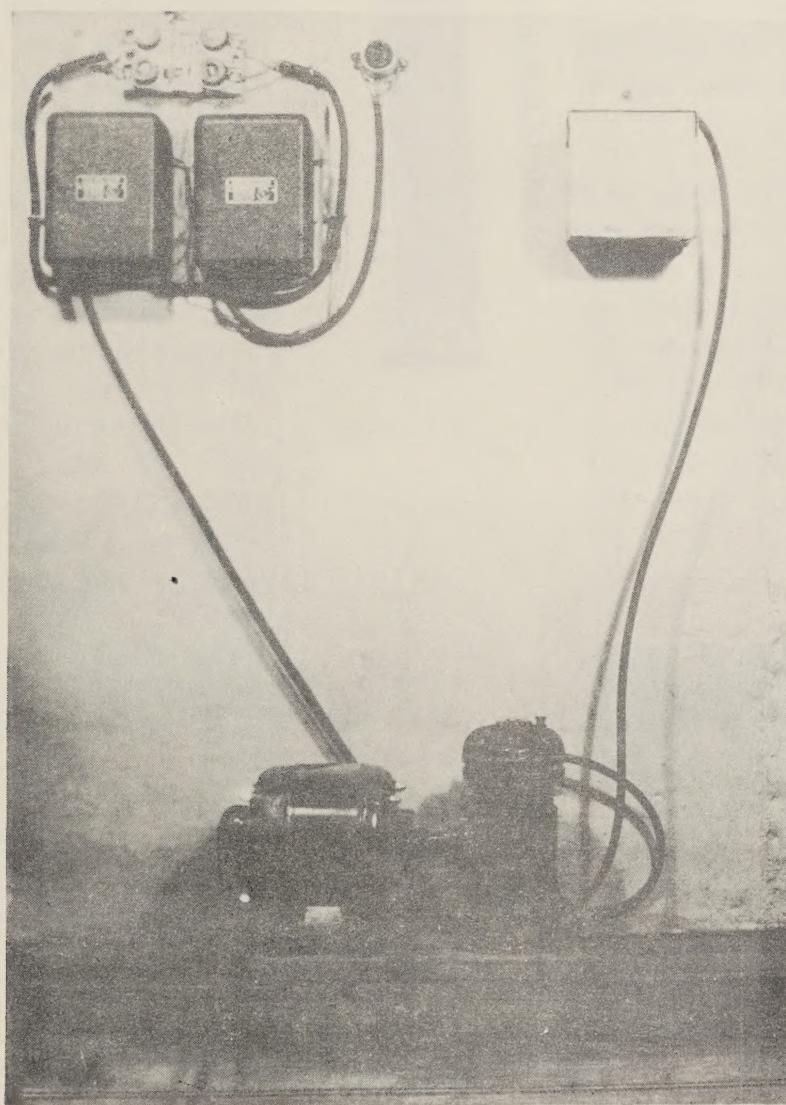


Figure 3.--Air compressor, relay boxes, and water tank mounted at side of incubator.

